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GLEN C. SANDERSON

PREDATOR CONTROL STUDY AND

AN ANALYSIS OF THE

PENNSYLVANIA BOUNTY SYSTEM

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PREDATOR CONTROL STUDY  
AND AN ANALYSIS OF THE  
PENNSYLVANIA BOUNTY SYSTEM

FINAL REPORT  
PITTMAN-ROBERTSON PROJECT 44-R

By

ROGER M. LATHAM, Project Leader

PENNSYLVANIA GAME COMMISSION

HARRISBURG

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## INTRODUCTION

Pennsylvania's bounty system, one of the oldest in the country, has been the object of conflicting opinions for many years. On the one hand, it is held up as an exemplary system -- one in which payment is centralized in a single office manned by experts and one in which fraud has been reduced to a minimum. On the other hand, it has been criticized relentlessly by a group of wildlife biologists who feel that any bounty system is impractical in modern game management. There is no doubt that Pennsylvania's system can be improved, but there is considerable doubt whether all bounty payment should be abolished immediately in a state where the game management program is so intensive and extensive.

The purpose of this report is not to discuss the merits or demerits of bounty systems in general, but rather to point out the possible inefficiencies in the Pennsylvania system and to make suggestions for its improvement, particularly from the standpoint of reducing costs. It is believed that this can be done without impairing the effectiveness of the system in the control of specific predatory animals believed to be detrimental to game populations. However, where there is insufficient proof that a certain predaceous species is materially reducing the harvestable game supply, for instance when food habits studies do not indicate this to be true, or when a species occurs in such small numbers that its total weight could have little effect upon game populations, then it appears reasonable to remove the bounty from these predators until such time as they are proven to be seriously destructive.







The purposes of this analysis and survey of the Pennsylvania bounty system were to determine methods for (1) maintaining or increasing its effectiveness and (2) reducing the costs of control wherever practicable.

#### A C K N O W L E D G M E N T S

It is with the sincerest appreciation that the aid of several persons is acknowledged.

Dr. K. R. Bennett, Agriculture Experiment Station Statistician, The Pennsylvania State College, was exceedingly helpful in outlining proper sampling procedures.

Harold L. Plasterer, Supervisor, Bounty Claims Section, Pennsylvania Game Commission, and his staff made available the bounty records and tabulated considerable material for the survey.

Robert D. McDowell, Chief, Wildlife Research Division, Pennsylvania Game Commission, provided supervision and criticized the manuscript.

The various District Game Protectors in the nine counties visited were splendidly cooperative. They were very helpful in locating claimants and in giving desired information.

#### M E T H O D S   O F   A N A L Y S I S

The problem of analyzing the Pennsylvania bounty system was approached in three ways: (1) by a detailed study of the bounty records as kept since 1913 by the Bounty Claims Section in Harrisburg; (2) by oral interviews with 1,289 claimants, representing a random sampling for the state for the two-year period prior to the inception of the study; and (3) by the use of 524 questionnaires as an accuracy check for the oral interview method of securing data.





## ANALYSIS OF BOUNTY RECORDS

The bounty records were examined in an effort to ascertain possible means for increasing the efficiency of the system, with particular emphasis upon reducing the costs without actually decreasing the normal annual reduction of predatory species as motivated by the payment of bounties. For instance, for horned owls, which must be presented for payment within 48 hours after killing, a compilation of claims was made by months. From this it was shown that a large percentage of these birds was killed during the regular small and large game hunting seasons during October, November, and December. The poll revealed that nearly all of these represented birds which would have been shot by hunters, regardless of the bounty. The suspension of the payment during these three months would result in a considerable saving without materially affecting the total kill.

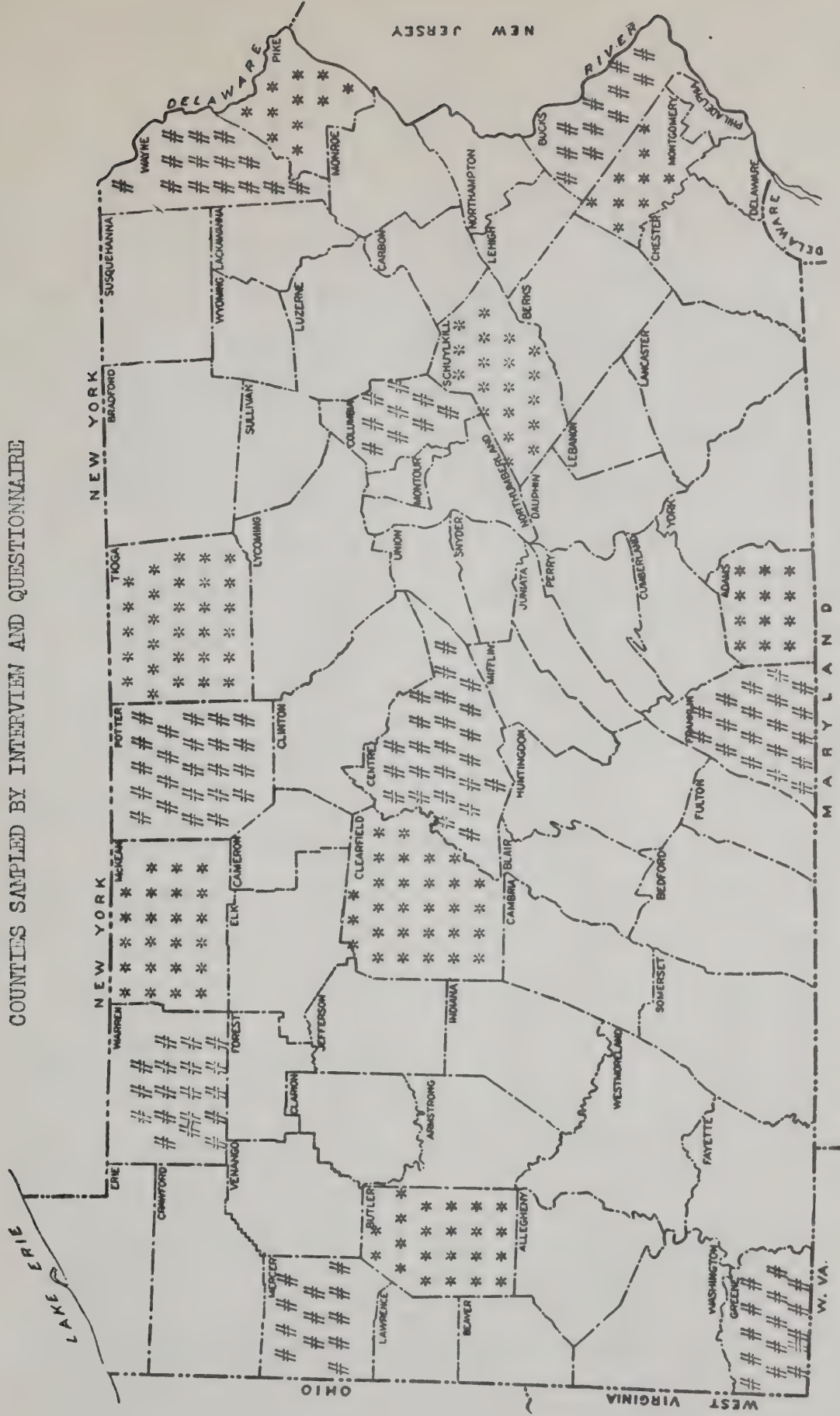
From further analysis, it was found that of approximately 25,000 foxes submitted during each of the two fiscal years, 1947-48 and 1948-49, about 6,000 each year represented single claims. Oral interviews and questionnaires corroborated the fact that most of these 6,000 were killed incidentally, accidentally, or as protection to livestock, and would have been killed whether a bounty were paid or not. Therefore, by eliminating claims of only one fox, about \$48,000 could have been saved during the two-year period without reducing the total take of foxes noticeably.

These are only two examples of the findings from the analytical study of the bounty records, but they serve to indicate the purpose and the possible uses of these data. All statistics derived from the scrutiny of the bounty records believed to be of possible value in increasing the efficiency of the system are described in detail in a later section of the report.





# COUNTIES SAMPLED BY INTERVIEW AND QUESTIONNAIRE



# Personal interview poll of claimants -- foxes, weasels, and horned owls.

\* Questionnaire poll of claimants -- foxes. Goshawk and horned owl questionnaires to all counties.

Figure 1





## ORAL INTERVIEW POLL

The oral interview method for obtaining data was used for one major purpose--to determine what per cent of the total number of predators submitted for the bounty payment were killed primarily for this reward. More or less incidental to this primary purpose, other data were secured: (1) the manner in which the animals were taken--shot, trapped, or otherwise; (2) whether the animals were killed while the claimant was hunting game; (3) whether the animals were killed to protect poultry or other livestock; (4) if the animals were taken in traps, whether the traps were set deliberately for the predators taken, or whether they were set for other furbearers, house rats, etc.; and (5) if dogs were used to hunt foxes, whether hounds or creepers (hole dogs), or both, were used. Naturally, considerable information was volunteered by the persons interviewed concerning the abundance or scarcities of the various predators, population trends, the destructiveness to game and poultry, and other similar items, plus their varied opinions, sentiments, and reactions to the Game Commission and the bounty system.

A statistician was consulted concerning the mechanics of interviewing a correct sample of the total number of claimants in the state. The minimum figure for acceptable accuracy was derived for each numerical classification and for each species, and this number was used as a basis for the poll. However, the required minimum was greatly increased before the field survey was completed because of more rapid coverage than had been anticipated. Table 1 gives the sampled proportions of the total number of claimants and of the total number of each species submitted for bounty.

Nine counties of the 67 in the state were selected for sampling--3 in the east, 3 in the central part, and 3 in the western part (Figure 1 shows the counties sampled by the oral interview method). These counties were chosen be-





Table 1. -- Size of poll sample for each bountied species.

FOXES				
Size of Claim	Claimants Sampled	Total Claimants	Animals Sampled	Total Animals
1	200	5823	200	5823
2	194	1479	388	2958
3-5	257	1476	888	5515
6+	315	1396	5549	20,530
WEASELS				
1	138	3058	138	3058
2	108	1328	216	2656
3-5	110	1471	417	5475
6+	64	835	757	8802
HORNED OWLS				
1	159	1112	159	1112
2	28	166	56	332
3-5	23	98	106	498
GOSHAWKS				
1-2	46	62	48	65



cause they were believed to be reasonably representative of the entire state, geographically, physiographically, agriculturally, and economically. Wayne, Potter, and Warren counties are typical of the mountainous "big woods" region, where forest land greatly exceeds agricultural land in the area. In Columbia, Centre, and Greene counties, forest and farm land are about equally divided; and Bucks, Franklin, and Mercer counties are essentially agricultural.

For the oral interviews, the fox bounty records for 1948-49 were used because this was the last year during which bounties were paid on both red and gray foxes. For weasels and horned owls, the 1949-50 records were used.

#### QUESTIONNAIRE POLL

Forty-four fox questionnaires were sent to each of eight additional counties lying adjacent to those sampled by the interview method. Eleven were sent to claimants who had bountied only one fox during the year, eleven to those who had submitted two, eleven to the group which had killed three to five, and eleven to those who had presented six or more. The questionnaires were sent alphabetically--that is, the first eleven names which fell within each of the above groups were chosen from the county lists. Of the total of 352 fox questionnaires sent to the eight counties, 249 (70.8%) were returned.

The horned owl questionnaires were sent to the first and last claimants appearing on each county list. The nine counties which had been surveyed by the interview method were excepted, and no owls had been killed in three other counties. Thus, only 55 of the 67 counties were polled in this manner, and one of these had only one claim. Of the 108 mailed, 82 (75.9%) were returned.

No attempt was made to gain information concerning goshawks by the interview method because the 62 claims presented during the 1948-49 and 1949-50 fiscal years were widely scattered throughout the state. Questionnaires were





sent to all 62 claimants, and 46 (74.2%) were completed and returned.

## FINDINGS

### FOXES

The red and gray foxes will be discussed jointly since there appears to be few, if any, differences in the problems of management and control presented by either species. From extensive food habits studies made in the state, both appear about equally destructive to game, although the red fox, because of its greater tendency to frequent agricultural lands, kills greater numbers of farm game species and poultry. Both foxes offer enjoyable recreation for owners of fox dogs. The grays are hunted with hounds and creepers, while red foxes are usually chased only with hounds. The red fox is preferred by those who "ride to the hounds" in southeastern and southwestern Pennsylvania, but it is probable that these people derive no greater pleasure from the hunt than those hundreds of men who follow their small "hole dogs" over rocky ridges in quest of the gray fox.

The past history of the fox bounty in Pennsylvania is one of outstanding mismanagement. Numerous writers have used these fox bounty records to prove that bounties cannot control predatory animals. But, in the case of the fox, the bounty system was never given a fair trial as a means of control in Pennsylvania. It has become axiomatic that a bounty cannot succeed as a control measure unless the reward is increased in direct proportion to the added difficulty of taking members of an ever-diminishing population, or unless the bounty payment is high enough in the first place to insure final control. In other words, a trapper may be stimulated to his best efforts with a \$4 bounty on foxes if he can catch fifty or more in his territory, but if foxes become so reduced that he can catch twenty-





five or less with the same amount of effort, the \$4 payment may be insufficient inducement for continued trapping. However, if the payment were doubled at this point, so that the return from his twenty-five foxes equalled that from the fifty foxes at the lower rate, his efforts would continue unabated.

An examination of past bounty records shows that a continuous \$4 bounty on foxes in Pennsylvania will not induce the degree of control desirable for intensive game management. When the fox population is very high, as in the 1944-46 period, the \$4 payment appeared to be effective in reducing the annual take from about 50,000 to about 30-35,000 foxes. But then there was an obvious leveling-off because at that density many trappers no longer found it profitable to trap. It then becomes a matter of "fox management" or "fox farming" by the professional trappers. These men are careful that they do not over-trap a particular region, and may even release all vixens late in the season so that the next year's supply is insured. Or, they may trap one portion of their territory fairly intensively one year, permit it to rest completely for one season while they trap another area, and then return to the first the following year or the second year. This can be done because only the professional trapper, who can devote full time to his enterprise, is willing to continue trapping under these conditions. Thus, the professional trapper holds the fox population at a "high-production" level, and will not voluntarily reduce their numbers to the point desired by the Game Commission unless forced to it by competition. At this point of low return, the part-time trapper and amateur lack the necessary financial stimulus and offer little competition.



But if the bounty payment is raised when this leveling-off occurs, immediately the hunting and trapping pressure is returned to the previous high intensity and it is impossible for the professional trapper to "manage" his foxes as before. Now if he "rests" a portion of his trapping territory, someone else will trap it anyway, and he is less likely to release vixens for breeding stock because he knows that the next person who catches them will probably collect the bounty. It is obvious then, that if a certain population level needs to be reached and maintained for the best interests of game, the bounty payments must be increased at each interval of stagnation. The Pennsylvania fox and weasel bounty history indicates an almost complete reverse tendency. Instead of raising the fee at the intervals when foxes and weasels were exhibiting marked reduction, the inclination has always been to decrease the payment or to remove it altogether. The bounty then would be restored or increased only when the predator once again became intolerably abundant, thus losing all that had been gained. Little wonder that adequate control was never realized nor maintained!

The immediate reaction to a suggestion for a sliding-scale of bounty payments is that a Conservation Commission financed by hunting license fees cannot afford to pay a reward for, let us say, \$10 for each fox killed. But, are not 50,000 foxes at \$4 more expensive than 10,000 or 15,000 at \$10 each? And more important, when 30,000 to 50,000 foxes are being killed at \$4, the purposes of the bounty (reduction and control) are not being achieved. If a gradual increase to a \$10 payment per fox insures a reduction to a point where only 10,000 to 15,000 are taken each year, then the money expended is a far more practical investment because there should be a noticeable difference in the numbers of small game animals remaining for harvest during the hunting season.





Table 2. — Foxes bountied per individual.

1948-49								
Foxes per claimant	1	2	3	4	5	6-10	11 or more	Totals
Number of claimants	5823 57.2%	1479 14.5%	717 7.1%	431 4.2%	328 3.2%	749 7.4%	647 6.4%	10,174
Number of foxes	5823 16.7%	2958 8.5%	2151 6.2%	1724 4.9%	1640 4.7%	5600 16.1%	14,930 42.9%	34,826
1947-48								
Foxes per claimant	1	2	3	4	5	6-10	11 or more	Totals
Number of claimants	6264 58.3%	1448 13.5%	789 7.3%	511 4.8%	358 3.3%	781 7.3%	593 5.5%	10,744
Number of foxes	6264 19.0%	2896 8.8%	2367 7.2%	2044 6.2%	1790 5.4%	5818 17.6%	11,787 35.8%	32,966





### Findings from analysis of bounty records

1. The fox records for a two-year period were examined and tabulated to show the number of claimants who had submitted only 1 fox for bounty during the fiscal year, 2 foxes, 3, 4, 5, 6 to 10, and 11 or more. This data is presented in Table 2. In conjunction with the field survey and the questionnaire returns, it was possible to determine the percentages of foxes in each of these groups which had been killed primarily for bounty or had been killed accidentally, incidentally, or as protection to poultry, etc. (Table 3.)

Of 10,183 claimants submitting foxes for bounty during the 1948-49 fiscal year, 5,823 (57%) of this number killed only one fox during the entire year. The 1947-48 records showed that 6,264 (58%) of 10,744 claimants killed only one fox. The field survey and questionnaire returns revealed that 72.9% of these foxes would have been taken even if no bounty were paid on these animals. Because \$47,948 could have been saved during this two-year period if no bounty had been paid to these single-fox claimants, it appears desirable for greatest efficiency to eliminate these claims in some manner if possible.

2. To show the effect of the removal of the red fox bounty as of July 1, 1949, the records for 1948-49 were compared with those for 1949-50. During the 1948-49 fiscal year, 738 claimants presented 10 or more foxes for bounty, but during the 1949-50 fiscal year this number of claimants fell to 261. These figures substantiated the findings of the field survey--that is, that a good proportion of the professional trappers had ceased their trapping efforts entirely until such time as the red fox bounty would be restored. Of those who did continue to trap in spite of this financial handicap, many released all red foxes which were taken in the traps as "management" insurance for future incomes.



3. It was thought desirable to know the number of bounty hunters or trappers who are "regulars" year after year. The fox records for 1947-48 and 1948-49 were scanned to determine the number and percentage of names appearing upon both lists. It was found that of 10,183 names for the 1948-49 fiscal year, 2,634 (26%) appeared on the 1947-48 list which contained 10,744 names. Naturally, this number included many claimants who were lucky enough to kill a single fox, accidentally or incidentally, and do not represent true bounty hunters or trappers. As would be expected, only a small percentage of the 5,823 claimants who submitted single foxes during the 1948-49 year were also listed on the 1947-48 records, but of the 647 claimants who had killed more than 10 foxes each, 77 per cent appeared both years.

#### Findings from personal interview and questionnaire polls

The data secured from personal interviews in the 9 sample counties and from the questionnaires to 8 sample counties will be presented collectively since the same questions were asked and the final results were reasonably close. The desired information was obtained for 712 claimants from the 1948-49 fox bounty list by the oral interview method, while 250 claimants from this list completed and returned questionnaires. The 712 claimants had bountied a total of 3,867 foxes for the year, and the 250 claimants answering the questionnaire had taken 1,579 foxes.

All findings were tabulated under four numerical headings in accordance with the number of foxes bountied by each claimant: 1 fox, 2 foxes, 3 to 5 foxes, and 6 or more foxes. The poll was designed to determine how many foxes within each group were taken (1) primarily for bounty, (2) incidentally to other activities, (3) accidentally, (4) as protection to poultry





or other livestock, or (5) as protection to game. These data are presented in Table 3. It will be noted that only 27.1 per cent of the foxes falling within the single-claim group were killed for the bounty. As would be expected, a far greater proportion (67.5%) of the foxes in the 2-fox claim category were taken for the bounty since few persons would have the opportunity to shoot more than one while hunting game, or to kill more than one on the highway, etc. Most of the 3-5 fox claims represented the efforts of part-time trappers and hunters using hounds or creepers (76.3%). Within this group, there was a considerable number (16.8%) killed to protect poultry. Sometimes these were trapped within close proximity of the barn yard or chicken range, but often this number were taken as pups from a nearby den after the parent foxes had stolen chickens or other poultry as food for their young. Almost all (93.4%) of the claims of 6 or more foxes were submitted by trappers or hunters who had put more than casual effort into the taking of the foxes. Again, a number were killed to protect poultry, and litters of 6 to 8 or more pups from a single den were included in this group.

Along with the information concerning the reasons for killing foxes just described, a record was also kept of the methods used by each claimant for taking foxes. These methods fell into six classifications: (1) Trapped--includes all foxes taken in traps regardless of the circumstances. (2) Shot--mostly by hunters during the fall small game and deer and bear seasons. Some were killed by woodchuck hunters during the summer months. Others were killed at dens in defense of poultry. Foxes shot before hounds or started by creepers were not placed in this category. (3) Hounds--foxes killed during the chase, (4) Creepers--foxes killed with the aid of these "hole dogs". (5) Hounds and creepers--when both were used in combination. (6) Otherwise--includes high-





Table 3. --- Findings from poll of fox bounty claimants for 1948-49.

(17 sample counties)

	1			2			3 to 5			6 or more			% Total foxes
	No. claimants	No. foxes	% foxes	No. claimants	No. foxes	% foxes	No. claimants	No. foxes	% foxes	No. claimants	No. foxes	% foxes	
*1	39	39	27.1	#94	189	67.5	146	440	76.3	211	3,968	93.4	77.4
**2	72	72	50.0	#25	51	18.2	#12	31	5.4	#1	1	---	10.8
***3	11	11	7.6	2	4	1.4	1	3	0.5	1	8	0.2	1.6
****4	21	21	14.6	15	30	10.7	29	97	16.8	21	212	5.0	9.0
*****5	1	1	0.7	3	6	2.1	2	6	1.0	7	61	1.4	1.3

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\* Foxes killed primarily for bounty.

\*\* Foxes taken incidentally to other activities--shot by hunters in small and large game seasons, etc.

\*\*\* Foxes taken accidentally--includes highway mortality, those killed by farm dogs, etc.

\*\*\*\* Foxes killed to protect poultry or other livestock.

\*\*\*\*\* Foxes killed to protect game--includes kill by Game Protectors, sportsmen's clubs, etc., falling within random sample.

# Partially or wholly made up of split claims.



Table 4. -- Foxes taken by various methods in Pennsylvania.

Size of claim	1	2	3 to 5	6 or more	% total
*Shot	44.6%	26.0%	9.1%	1.0%	11.7%
Trapped	25.0	53.7	54.5	75.3	61.8
Hounds	18.0	14.8	26.8	12.9	16.1
Creepers	1.8	1.9	3.2	2.7	2.6
Hounds and Creepers	3.5	1.9	3.6	8.0	6.0
**Otherwise	7.1	1.9	2.7	---	1.8

\* Does not include foxes shot before hounds or creepers.

\*\* Highway mortality, dug out of dens, killed by farm dogs, etc.





way mortality, digging out of dens, those killed by farm dogs, etc. Table 4 lists the numbers of foxes in each of the six classifications under the four numerical categories previously discussed.

#### WEASELS

Two very significant facts stand out above all others when past weasel management is analyzed. First, there have been no positive studies in Pennsylvania, nor any other nearby state, to show that the weasel is sufficiently destructive to game to warrant control measures other than that gained through the annual fur harvest. No comprehensive food habits study of the weasel has been undertaken by the Commission, and no studies concerning its relationship to small game have been made on specific land areas. The five most complete food habits studies of the weasel in eastern United States, including one for Pennsylvania made by the Pennsylvania State College (Glover, 1942), show that 70, 83, 76, 88, and 93 per cent of the diet is composed of mice and a few other small animals such as shrews, moles, chipmunks, house rats, etc. Only 13, 17, 14, 8, and 0 per cent of the food was cottontail rabbit. Game birds occurred in negligible numbers.

It is perhaps unfortunate that nearly one and one-half million dollars have been paid in bounties on an animal whose exact ecological relationship to small game is unknown. Its reputed destructiveness to game has arisen almost entirely from unscientific observations, and no conclusive evidence exists which would prove that the weasel is any more ~~deleterious~~ deleterious to game supplies than raccoons, skunks, opossums, minks, stray house cats, crows, Cooper's hawks, and other predatory species upon which no bounty is paid. Hundreds of areas within



the state support high populations of both weasels and small game, while other regions where weasels are scarce often provide poor rabbit and bird shooting.

Because of its diminutive size, one of the three species of weasels (Least weasel, Mustela rixosa) found in the state is believed to live almost exclusively upon mice and other mammals of similar size. Another (Bonaparte's weasel, Mustela cicognanii) is also small and is probably more inclined to kill mice than game. The third species (New York weasel, Mustela frenata) is the largest of the three and is probably most destructive to game, but even it should not be condemned until research studies prove its destructiveness. It is entirely possible that a bounty is being paid upon an animal whose beneficial habit of killing mice and other destructive rodents may far outweigh its ill effects upon game supplies. Even now, many farmers are inclined to protect a weasel which takes up its abode around the farm buildings because they recognize its ability to control rats and mice. This information was volunteered many times during the personal interviews.

Secondly, the weasel is a valuable furbearer and is trapped more for its pelt, at present, than for the bounty. The vast majority of weasels are taken, not by persons specializing in weasel trapping as in the case of the fox, but rather by fur trappers who set for weasels, skunks, opossums, muskrats, and other common fur animals and accept whatever enters the trap. This is clearly shown by the fact that only 240 (3.6%) of the 6,690 claimants presenting weasels for bounty during the 1949-50 fiscal year caught more than 10 weasels during the year (Table 5). In fact, 3,058 of the 6,690 claimants presented only one weasel, and almost all of these would have been killed even though no bounty were paid on this predator. A large majority of these single claims represented weasels





Table 5. -- Weasels bountied per individual, 1949-50.

Weasels per claimant	1	2	3	4	5	6-10	11 or more	Totals
Number of claimants	3058 45.7%	1328 19.8%	710 10.6%	460 6.9%	301 4.5%	595 8.9%	240 3.6%	6,690
Number of weasels	3058 15.3%	2656 13.3%	2130 10.7%	1840 9.2%	1505 7.5%	4024 20.1%	4778 23.9%	19,991



caught in traps set around the barn, chicken house, or even in the cellar drain for house rats. Many others were killed upon the highways, clubbed by farmers in poultry houses or in the hayfields, or shot by hunters. Claims of as high as six or eight often represented the work of house cats which would catch them and deposit their carcasses upon the back porch, or of a spry farm dog which would destroy an entire family of young weasels as a board pile was torn down by farm boys. Entire litters are plowed out and sent to Harrisburg. But the greatest number of small claims (10 weasels or less) were composed of animals taken either incidentally to specialized trapping (caught in fox, mink, raccoon, or muskrat sets) or taken on the common skunk-opossum-weasel trapline. Thus, the large majority of weasels presented for bounty would be taken in spite of the bounty payment.

#### Findings from personal interview poll

During the course of the field survey, 420 weasel claimants, who had killed 1,527 weasels, were interviewed. Table 6 shows that 35 per cent of those killing only one weasel during the 1949-50 fiscal year were uninfluenced by the bounty payment and that, of all weasels representing claims of 5 or less, 82 per cent were taken primarily for bounty. However, these figures are misleading. It was impossible to distinguish between trappers who were trapping weasels exclusively for bounty and those who were trapping several kinds of furbearers but still collecting the bounty payment on any weasels they might catch. If a man catches four or five weasels while running a trapline set for skunks, opossums, weasels, raccoons, muskrats, etc., are the weasels caught incidentally or should this man be considered a bounty trapper? Few persons with claims of ten or less were found to be trapping nothing but weasels. Nearly all of





Table 6. — Findings from poll of weasel bounty claimants for 1949-50.

(9 sample counties)

	1		2		3 to 5		6 or more		
	No. claim- ants	No. weasels	No. claim- ants	No. weasels	No. claim- ants	No. weasels	No. claim- ants	No. weasels	% total weasels
*1	90	90	88	176	97	366	63	751	88.6
**2	14	14	11	22	1	5	1	6	3.6
***3	12	12	2	4	6	23	—	—	3.1
****4	22	22	7	14	6	22	—	—	4.7

\* Weasels killed primarily for bounty, but includes all weasels taken in traps set for furbearers.

\*\* Weasels taken incidentally to other activities—in traps set for house rats; shot by hunters; etc.

\*\*\* Weasels taken accidentally—highway mortality; caught by cats or dogs; killed by farm machinery, etc.

\*\*\*\* Weasels killed to protect poultry.

1. The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future. The author points out that the study of history is not only a means of satisfying a natural curiosity about the past, but also a means of developing a sense of responsibility for the future. He concludes that the study of history is a necessary part of a liberal education and that it should be made a compulsory part of the curriculum of all schools and colleges.

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these were taken in the standard fur trapline. Therefore, it seems safe to assume that a large proportion of these weasels would have been caught whether the bounty was in force or not. This would automatically place most of these small claims in the "incidental" column. However, this procedure would be criticized because the bounty on weasels might be partially responsible, at least, for the setting of the traps in the first place. For that reason, all weasels taken in traps set deliberately for weasels or other furbearers were considered as being trapped primarily for the bounty, although this is certainly not a valid classification.

Because the information gained from the interview poll was deemed adequate, no questionnaires were sent to weasel claimants.

#### HORNED OWLS

Extensive food habits studies undertaken by members of the Commission research staff, by Museum personnel, and by other individuals have conclusively demonstrated the game-killing proclivities of the horned owl in Pennsylvania. While there are wildlife workers who would doubt the value of horned owl control, whether by bounty payments or otherwise, the fact remains that stomach and pellet analyses, nest studies, and field observations have proven that these owls kill large numbers of rabbits, ringnecked pheasants, ruffed grouse, other small game, and poultry each year. For this reason, it is probable that these depredations represent a loss of recreation to the hunters in Pennsylvania where game is managed so intensively. The positive economic loss to farmers cannot be disputed. Therefore, the writer does not recommend, for the present at least, that the bounty be removed from the horned owl but instead that efforts be made to reduce the cost of control to a minimum.





The analysis of the bounty records and the field survey produced the following information concerning the horned owl:

(1) Of 1,376 claimants presenting owls during the 1949-50 fiscal year, 1,112 (81%) submitted one owl each. Only 98 (7%) were paid bounty for 3 or more owls and 30 (2%) for 5 or more.

(2) Of 1,942 owls bountied during the 1949-50 fiscal year, 1,112 (60%) represented single claims (one owl per person per year) and 498 (26%) represented claims for 3 or more.

Table 7. -- Horned owls bountied per individual, 1949-50.

Owls per claimant	1	2	3	4	5 or more	Totals
Number of claimants	1,112 80.8%	166 12.1%	49 3.6%	19 1.4%	30 2.2%	1,376
Number of owls	1,112 57.3%	332 17.1%	147 7.6%	76 3.9%	275 14.2%	1,942

Table 8. -- Horned owls bountied by months

3-year average, 1947-50

June	129	January	144
July	76	February	97
August	77	March	121
September	86	April	105
October	146)	May	126
November	367) 44%		
December	255)	Total (3 years)	5,207

Table 9. -- Horned owls taken by various methods in Pennsylvania.

Size of claim	1	2	3 or more	Total
Shot	57.9%	47.8%	9.6%	43.8%
Trapped	40.0	52.2	90.4	55.0
Otherwise	2.1	-	-	1.2

1. The first part of the paper is devoted to the study of the

properties of the function  $f(x)$  defined by the equation

$$f(x) = \int_0^x \frac{1}{1+t^2} dt, \quad x \in \mathbb{R}.$$

It is well known that this function is strictly increasing and concave down.

Moreover, it satisfies the identity

$$f(x) + f\left(\frac{1}{x}\right) = \frac{\pi}{2}, \quad x \neq 0.$$

The second part of the paper is devoted to the study of the

properties of the function  $g(x)$  defined by the equation

$$g(x) = \int_0^x \frac{1}{1+t^4} dt, \quad x \in \mathbb{R}.$$

It is well known that this function is strictly increasing and concave down.

Moreover, it satisfies the identity

$$g(x) + g\left(\frac{1}{x}\right) = \frac{\pi}{2}, \quad x \neq 0.$$

The third part of the paper is devoted to the study of the

properties of the function  $h(x)$  defined by the equation

$$h(x) = \int_0^x \frac{1}{1+t^6} dt, \quad x \in \mathbb{R}.$$

It is well known that this function is strictly increasing and concave down.

Moreover, it satisfies the identity

$$h(x) + h\left(\frac{1}{x}\right) = \frac{\pi}{2}, \quad x \neq 0.$$

The fourth part of the paper is devoted to the study of the

properties of the function  $k(x)$  defined by the equation

$$k(x) = \int_0^x \frac{1}{1+t^8} dt, \quad x \in \mathbb{R}.$$

It is well known that this function is strictly increasing and concave down.

Moreover, it satisfies the identity

$$k(x) + k\left(\frac{1}{x}\right) = \frac{\pi}{2}, \quad x \neq 0.$$

The fifth part of the paper is devoted to the study of the

properties of the function  $l(x)$  defined by the equation



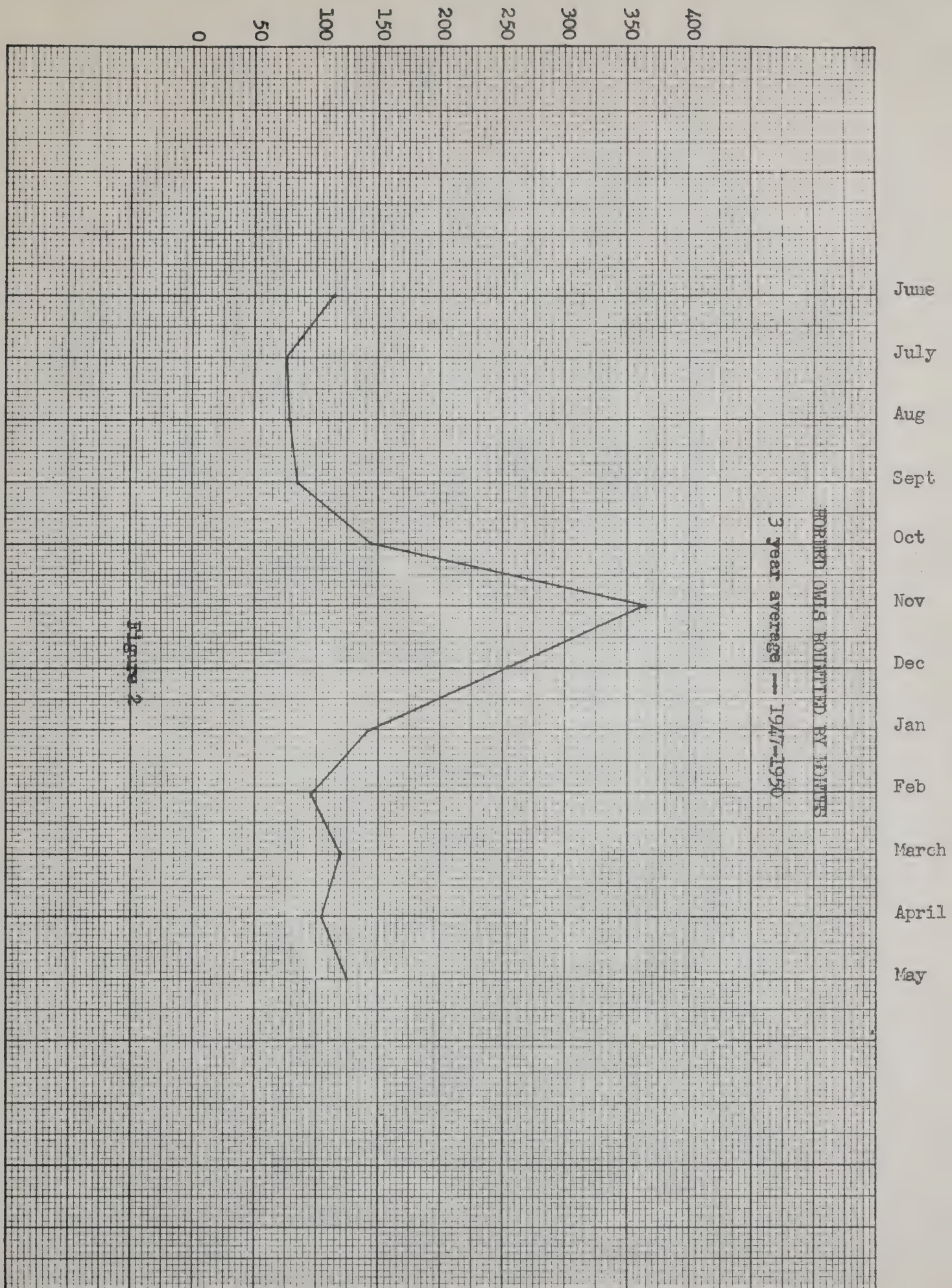


Figure 2





Table 10. --- Findings from poll of horned owl bounty claimants for 1949-50.  
(Personal interviews in 9 sample counties and questionnaires to 56 counties)

	1			2			3 or more			% total owls
	No. claimants	No. owls	% owls	No. claimants	No. owls	% owls	No. claimants	No. owls	% owls	
*1	27	27	16.8	14	28	48.3	20	96	90.6	41.1
**2	75	75	46.6	7	14	24.2	-	-	-	30.8
***3	8	8	5.0	-	-	-	-	-	-	2.9
****4	44	44	27.3	7	14	24.2	2	7	6.6	21.5
*****5	7	7	4.3	1	2	3.4	1	3	2.8	3.7

\* Owls taken primarily for the bounty.

\*\* Owls taken incidentally to other activities---shot by hunters during the small and large game seasons, etc.

\*\*\* Owls killed accidentally---includes highway mortality, etc.

\*\*\*\* Owls killed to protect poultry.

\*\*\*\*\* Owls killed to protect game---includes claims of Game Protectors falling within random sample, etc.

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(3) A breakdown of the owl records for the three-year period from 1947 to 1950 (Figure 2 and Table 8) by months revealed that 44 per cent of the total annual kill was made during October, November, and December--the three regular hunting season months. If no bounty had been paid during this period for the past three years, the savings would have amounted to about \$10,000.

(4) The combined results of the interview and questionnaire polls showed that 1,139 (59%) of the 1,942 owls submitted for bounty during the 1949-50 fiscal year were taken for reasons other than directly for the bounty payment.

(5) Based upon the results of the poll, 802 (43.8%) of the 1,942 owls for 1949-50 were shot. ~~Most of these~~ were killed by hunters during the regular hunting season. Of the year's total, 1,111 (55.0%) were trapped. This includes those taken in pole traps set purposely for owls, in miscellaneous sets made to catch owls which had been taking poultry, and in baited sets made for furbearers. About 29 (1.2%) were killed in some other manner. These included owls hit by automobiles, killed with stones or clubs, caught in chicken houses, etc.

#### GOSHAWKS

The goshawk, because of its emigratory nature, does not present the same control problems as the horned owl. Pennsylvania represents the extreme southern edge of this hawk's breeding range, and only an insignificant number nest in the more northern counties. During most years, it is probable that less than 200 winter in the state. However, because this resident of Canada is primarily dependent upon such cyclic species as the ruffed grouse and snowshoe hare for its food supply, this raptor is forced periodically to migrate southward during the years of greatest prey scarcity. These recurrent emigrations appear to follow fairly closely the ten-year cycle of the grouse and



(3) A breakdown of the total number of persons arrested from 1941 to 1950 (Tables S and Table R) by region revealed that in the years 1941-1943, the three regions of the North, West, and South, respectively, had the highest number of arrests. It was found that the percentage of persons arrested in the North region was about 10%.

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hares, but may vary one or two years either way. Thus, for at least eight of every ten years, the goshawk is not a significant factor in the reduction of game populations simply because it occurs in such small numbers.

An analysis of the bounty records reveals that the number of goshawks presented for bounty during the past ten years (1940-1950) has averaged only 44 hawks per year. The greatest number of claims for any single year came at the peak of the abnormally heavy migration of 1936-37 when 1,080 were killed. Two years later only 52 were taken in the state. Of 61 claimants presenting goshawks for bounty during the two-year period (1948-1950) only 3 had killed more than one hawk, and each of these had killed only 2.

Table 11. -- Goshawks bountied by months

	3-year total 1947-50	1936-37	
June	4	---	
July	2	---	
August	2	---	
September	1	---	
October	4)	---	
November	39)	537)	73%
December	9)	246)	
January	10	119	
February	5	99	
March	5	64	
April	3	15	
May	5	---	
Totals	89	1,080	





June  
July  
August  
Sept  
Oct  
Nov  
Dec  
Jan  
Feb  
March  
April  
May

GOSHAWKS BOULLETED BY MONTHS  
3 year total — 1947-1950

50  
45  
40  
35  
30  
25  
20  
15  
10  
5  
0

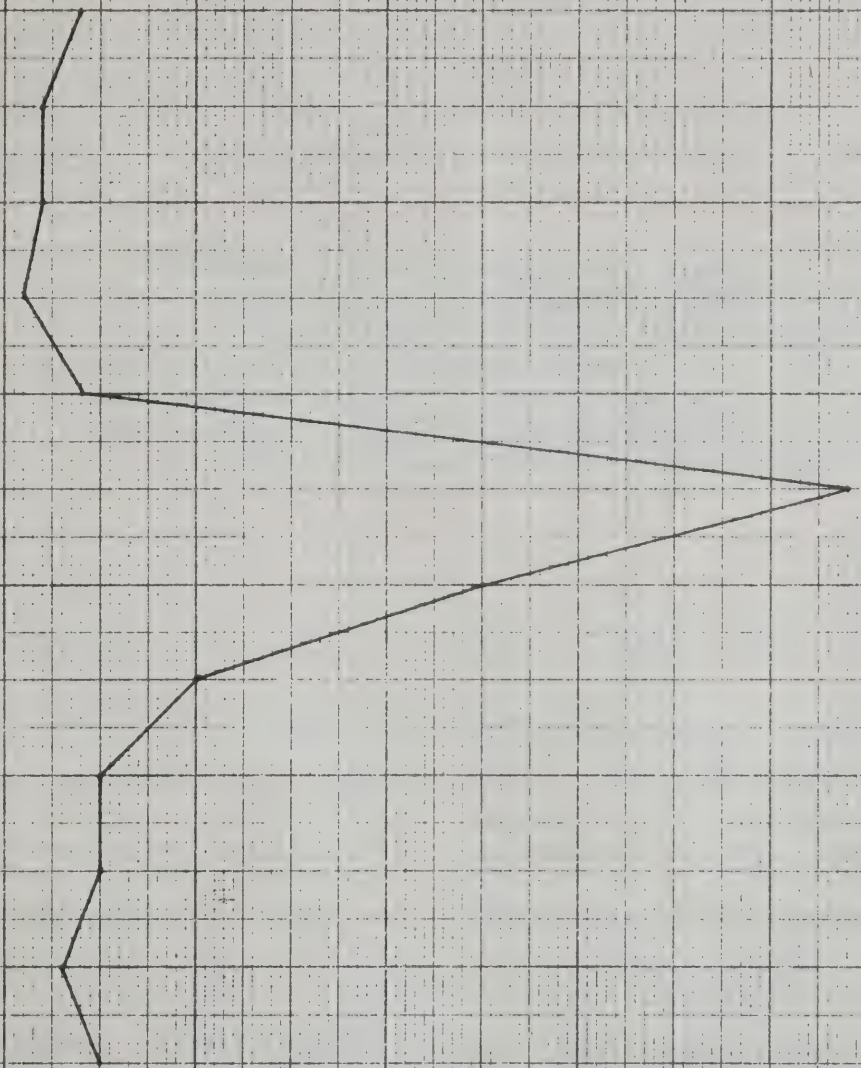


Figure 3





Table 12. -- Findings from poll of goshawk bounty claimants.

(Entire state--1948-49 and 1949-50)

	Claimants	Goshawks	% Goshawks
#1	2	2	4.2
##2	25	25	52.1
###3	4	5	10.4
####4	10	10	20.8
#####5	5	6	12.5

\* Goshawks killed primarily for bounty.

\*\* Goshawks killed incidentally to other activities; shot by hunters during small and large game hunting seasons, etc.

\*\*\* Goshawks taken accidentally.

\*\*\*\* Goshawks killed to protect poultry.

\*\*\*\*\* Goshawks killed to protect game; usually shot or trapped at site of kill or shot while attempting to prey upon game.

Table 11 and Figure 3 show that a majority (58%) of goshawks are killed by hunters during the October-November-December hunting seasons. A breakdown of the 1936-37 records reveals that 783 (73%) of the 1,080 hawks were killed during October, November and December. This is perhaps the most undesirable feature of a bounty upon goshawks. Since only a minute fraction of the hunters are capable of identifying a goshawk at a distance, and probably less than five per cent could positively identify one in the hand, the temptation is constantly before the hunters to shoot every hawk they can with the hope that it might be a goshawk worth \$5. Since an average of only 44 goshawks a year are killed, it is obvious that great numbers of beneficial hawks are sacrificed each year for

\* See also: "The New York Times," 1970-1980, p. 11, col. 1

1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-2642-2643-2644-2645-2646-2647-2648-2649-2650-2651-2652-2653-2654-2655-2656-2657-2658-2659-2660-2661-2662-2663-2664-2665-2666-2667-2668-2669-2670-2671-2672-2673-2674-2675-2676-2677-2678-2679-2680-2681-2682-2683-2684-2685-2686-2687-2688-2689-2690-2691-2692-2693-2694-2695-2696-2697-2698-2699-2700-2701-2702-2703-2704-2705-2706-2707-2708-2709-2710-2711-2712-2713-2714-2715-2716-2717-2718-2719-2720-2721-2722-2723-2724-2725-2726-2727-2728-2729-2730-2731-2732-2733-2734-2735-2736-2737-2738-2739-2740-2741-2742-2743-2744-2745-2746-2747-2748-2749-2750-2751-2752-2753-2754-2755-2756-2757-2758-2759-2760-2761-2762-2763-2764-2765

practically nothing. Every District Game Protector, and Justice of the Peace, has experienced the repeated visits of hunters with hawks which they believed (or hoped) were goshawks but which almost invariably turned out to be redtails, marsh hawks, or some other protected species. The Bounty Claims Section at Harrisburg has received every kind of hawk native to the state--all sent in as "goshawks".

In order to determine whether the bounty payment (\$5) upon the goshawk materially affects the annual kill, a questionnaire was sent to all claimants who had submitted goshawks for the bounty during the 1948-49 and 1948-50 fiscal years. Of 46 returning the questionnaires, only 2 (4.2%) stated that they had deliberately killed the hawks for bounty. Table 12 lists the conditions under which these hawks were killed. Of the 48 hawks covered by the questionnaires, 40 were shot, 7 were trapped, and 1 was killed otherwise.

#### OTHER PREDATORS

There is good reason to believe that certain predators which are not on the bounty list at present may be more destructive to game than certain ones upon which a bounty is being paid. There is a constant pressure from hunters, farmers, and other groups for an extension of these fees to include raccoons, skunks, opossums, certain hawks, crows, and a great variety of other predaceous birds and mammals. However, it is not recommended that any additional animals be placed upon the bounty list unless, at some future time, carefully executed ecological studies prove a certain predatory species to be inimical to the best interests of wildLife conservation in the state and the bounty system appears to be the only workable means of reduction and control of that species.





The annual fur harvest is ordinarily sufficient to keep the numbers of skunks, opossums, and raccoons within reasonable control, but, during the recent stagnation of the long-hair fur market, raccoons and opossums have increased tremendously. Skunks, at present, appear to be suffering from some epidemic disease which has almost eradicated them in many portions of the state. Fox trappers, particularly those using the "dirt-hole" set in early fall, catch many thousands of raccoons, opossums, and skunks and may be aiding materially in the reduction of their numbers during the fur market slump. Plasterer (1941) in reporting on this situation says: "It may be surprising to know how many raccoons, especially young ones in northern counties, are caught in summer sets for foxes. As a general average, two raccoons are caught for each fox taken. A few trappers truthfully report catching thirty, fifty, seventy, and in one case, two trappers working together reported catching one hundred twenty raccoons before the opening of the raccoon season."

When fur prices are normal, this loss of unprime fur animals would be regrettable, but the amount of control inadvertently exercised upon these animals, particularly since they are now trapped and hunted less during the regular season, may be of real benefit to wild game.

## CONCLUSIONS AND RECOMMENDATIONS

### FOXES

1. The writer had planned to recommend that the red fox be returned to the bounty list, but this action was taken by the Commission during its January, 1951, meeting. From conversations with many fox trappers throughout the state, it appeared that a \$2 bounty on red foxes would have

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been sufficient stimulus for most professional trappers to return to their traplines, but the \$4 reward should see a tremendous effort during the 1951-52 fiscal year. With foxes at such a high level, it is predicted that the take during the coming fiscal year will approach or exceed that of the high years of 1945-46 and 1946-47.

2. It is recommended that a determined effort be made to reduce the fox population to a desired level and maintain it at this level by the intelligent use of the bounty system. This would involve increasing the amount of the fee at indefinite periods which could be determined by a constant analysis of the bounty records. Whenever the annual kill indicates a stagnation of trapping effort, the payment should be increased by \$2 (?) on both species. This would spur the professional trapper to even greater efforts and would keep the part-time trappers and hunters active.

One modification of this sliding-scale procedure is suggested. That is, if the price of red foxes should rise markedly during the next few years, a parity should be established for the red in relation to the existing fur price. Let us suppose that the bounty by 1953 or 1954 is \$6 on both species and the red fox pelts are worth \$1, or less, as they are at present. If the price of red fox furs should suddenly rise to \$5 because of the dictates of fashion, then from the standpoint of sound economy the bounty payment should be reduced in proportion. If the fur price should go even higher, the bounty on the red could be removed entirely until such time as the fur again fell below parity. The same procedure could also be applied to the gray fox, but its fur seldom fluctuates in price to any extent.

The investigator should like to emphasize, over and over again, that this recommended procedure of sliding-scale payments is absolutely essential to



from religious activities for that purpose. The fact that the religious activities were conducted in a building owned by the religious community, and that the religious community was the one who paid the expenses of the religious activities, is not sufficient to establish that the religious activities were conducted for a religious purpose. The fact that the religious activities were conducted in a building owned by the religious community, and that the religious community was the one who paid the expenses of the religious activities, is not sufficient to establish that the religious activities were conducted for a religious purpose.

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It is the responsibility of the religious community to establish that the religious activities were conducted for a religious purpose. The fact that the religious activities were conducted in a building owned by the religious community, and that the religious community was the one who paid the expenses of the religious activities, is not sufficient to establish that the religious activities were conducted for a religious purpose. The fact that the religious activities were conducted in a building owned by the religious community, and that the religious community was the one who paid the expenses of the religious activities, is not sufficient to establish that the religious activities were conducted for a religious purpose.

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The fact that the religious activities were conducted in a building owned by the religious community, and that the religious community was the one who paid the expenses of the religious activities, is not sufficient to establish that the religious activities were conducted for a religious purpose.

accomplish the real purpose of the bounty system. These payments will practically eliminate the undesirable "fox farming" by the professional trapper, and, most important, they should effect a degree of control most consistent with the game management requirements of the state.

3. The taking of foxes by hunting with hounds or creepers should be given greater publicity in an effort to influence more people to adopt this excellent sport. Any decided increase in this activity should have three positive benefits: (a) a reduction of foxes with a consequent benefit to game and to poultry raisers; (b) an increased amount of outdoor recreation for those adopting the sport; and (c) the diversion of a certain amount of hunting pressure from game to foxes. Those who actively participate in this sport will find that their "hunting season" now extends from September through March. This may aid in eliminating some of the criticism directed toward the shortness of the small game season, the decreased bag limits, and other similar objections. Also, most sportsmen who hunt foxes feel that they are "doing their bit" toward the protection of game, and become more interested in its conservation and management as a consequence. Many fox hunters open the stomachs of the foxes they kill and examine the contents. When game is found, they feel doubly rewarded, because to them it means that another "killer" has been destroyed.

The publicity concerning fox hunting could take the form of articles in the GAME NEWS, Game Commission educational pamphlets, newspaper releases, lectures by the Conservation Education Assistants, and movies. Both hounds and creepers should be featured, since one or the other may be more useful in different parts of the state. One man in Columbia County, with the aid of his companions, killed 110 gray foxes and several red foxes over his three hounds last year (1949-50). If this could be repeated all over the state, much good would be accomplished!

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4. During the past two years, over 15,000 of the 67,792 foxes bountied were killed for reasons other than for the bounty reward. No practical or workable means can be suggested for saving this \$60,000 paid for the 15,000 foxes. However, of the 12,000 foxes submitted as single claims during those two years, only 27.1% were killed for bounty. For economy's sake, it seems desirable to eliminate these single claims. By this action, \$48,000 of the \$60,000 could have been saved during the two-year period.

To do the obvious thing -- refuse to pay bounty on claims of less than two foxes -- would certainly invite fraud, because there would be a definite pooling of pelts in every neighborhood. A more workable solution, perhaps, lies in the issuance of a bounty license. This system would require each man who anticipates hunting or trapping for bounty to purchase a license. If this license were to cost \$4 (the bounty payment for 1 fox) it should eliminate almost all single claims and many other small claims of incidental nature. Through this method, if fraud can be held to a minimum, about one-fourth the annual cost of the fox bounty could be saved without appreciably reducing the total kill of foxes. This \$24,000 a year saved (based on the records of the past two years) plus the money received from bounty licenses should aid considerably in reducing the cost of fox control. This bounty license would not restrict the efforts of young boys and part-time trappers as a regular trapping license would, and is, therefore, more desirable in many ways. Youngsters should be encouraged in every way to trap and otherwise participate in healthful outdoor recreation, and no restricting influence, such as a trapping license, should be placed on their activities.

#### WEASELS

It is recommended that the bounty be removed entirely from weasels for the following reasons: (a) No positive proof exists that weasels are





sufficiently destructive to small game to limit the numbers remaining for recreation during the fall hunting seasons; (b) there is no reason to believe that weasels are more detrimental to game populations than several other predators upon which no bounty is paid; (c) the weasel population fluctuates greatly in spite of a constant bounty payment, thus suggesting a natural control; (d) the high fur value of weasels makes it an attractive prize for fur trappers and assures a constant annual harvest; and (e) the results of this survey indicate that at least 75 per cent of the weasels killed would be taken whether a bounty is paid or not.

#### HORNED OWLS

1. From the questionnaires and field interviews it was learned that only 30 per cent of the total number of owls sent in for bounty are taken by persons hunting or trapping primarily for this reward. In other words, 70 per cent of all the owls killed would have been killed whether a bounty was in force or not. Also, it was found that 44 per cent of the annual kill was taken during the three fall months and, since almost all of these owls were killed by hunters while hunting small or large game, this expenditure represents an undesirable inefficiency. Therefore, it is recommended that the bounty be removed during the months of October, November, and December of each year. This action would have saved about \$10,000 during the past three years without noticeably affecting the total annual kill.

2. Sixty per cent of all owls submitted for bounty represented single claims for the year -- that is, one owl per man per year. The feasibility of eliminating single claims by the use of a bounty license has been discussed under foxes. It is possible that this plan could also be applied to horned owls with a considerable savings. However, the elimination of

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bounty payments on owls during October, November, and December would automatically dispose of a large proportion of the single claims.

3. It is further recommended that consideration be given the problem of pole traps set for horned owls. In certain counties, the use of pole traps for owls has become widespread, and some men leave several of these traps set the year around. Nearly all large owl claims (10 or more) were composed of birds taken in pole traps. Probably most of these pole sets average from 2 to 5 protected hawks for each owl taken, and during the spring and fall migrations single traps may catch 2, 3, or more each week. Perhaps for the months of April, May, September, and October the use of pole traps should be outlawed.

4. As in the case of the fox, the sport of hunting owls by driving and by calling should be publicized. Here again, this "off-season" hunting would provide additional recreation for the sportsmen and, at the same time, decrease the numbers of resident owls. A number of men who completed and returned the owl questionnaires asked for information concerning the hunting of owls.

#### GOSHAWKS

The information gained from the goshawk questionnaires proved that the Game Commission at its January, 1951, meeting was wise in removing the goshawk from the bounty list. The findings from the questionnaires sent to all goshawk claimants for the past two years (1948-49 and 1949-50) showed that not more than 4.2% of these birds are taken for the bounty and that all of the remainder would be killed without this reward. Actually, those included within this 4.2% are of dubious classification, since none of these claimants took more than one hawk during the two years. As a safe generality, it can be stated



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### CONCLUSION

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that the bounty has no effect upon the annual kill of goshawks and that, there-  
fore, this expenditure has been a gross inefficiency of the system. Also, as  
stated before in this report, a bounty on goshawks encourages hunters to shoot  
every hawk they see with the hope that it will turn out to be a goshawk. With  
a ratio of perhaps 500 or more other hawks for each goshawk in the state during  
most years, the odds against success are high.

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